Contents [hide]

MULTITECH xDot Long Range LoRa Module

Product Usage Instructions

- Follow the provided installation guide to properly set up the xDot device.
- Ensure proper connectivity to your desired electronic interface using SPI, UART, I2C, or Analog Digital connections.
- Manage power settings according to your requirements to optimize battery life.
- Utilize the provided communication interfaces for data transmission and reception.
- Regularly check and update firmware as necessary for optimal performance.

Introduction

- MultiTech xDot® is a secure, end-certified, Arm® Mbed™ programmable, low-power RF module that provides long-range, low bit rate M2M data connectivity to sensors, industrial equipment and remote appliances.
- The xDot is LoRaWAN® 1.0.4 compliant, providing bi-directional data communication up to 10 miles / 15 km line-of-sight and 1-3 miles / 2 km into buildings**, using sub-GHz ISM bands in North America, Europe, Australia (AU915), Asia Pacific (AS923), India (IN865), and Korea (KR920).
- xDots bring intelligence, reduced complexity, and a lower overall bill of material cost to the very edge of the network while supporting a variety of electronic interfaces to connect just about any “Thing” for years on battery power.

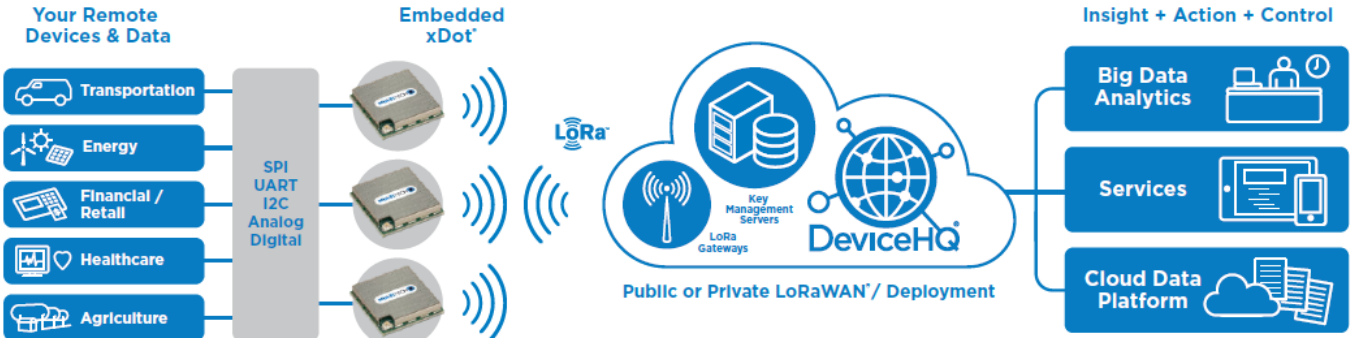
BENEFITS

- Range of miles

- Deep in-building penetration
- Developer friendly
- Runs for years on batteries

FEATURES

- End-certified for use in North America, Europe, Australia, Japan, Korea & India
- LoRaWAN CertifiedCM
- Unicast & Multicast message support
- Multiple I/O interfaces for almost any “Thing”
- Data rates 293bps-20Kbps+ LoRa®
- Listen-Before-Talk (LBT) is enabled in Japan & Korea models



SPECIFICATIONS

Models	**MTXDOT-AS1**	**MTXDOT-AU1**	**MTXDOT-EU1**
Region/Country	Asia Pacific (**)	Australia	Europe
LoRa Radio Frequency Pla n	AS920-923 (“AS 1”)	AU915-928	EU863-870
Listen-Before-Talk (LBT) E nabled	No		
Channel Capacity	8-channels		
Range	Up to 10 miles (15 km) line of sight, 1 – 3 miles (2km) in to buildings		

Communication	LoRaWAN 1.0.4 compliant, Class A and Class C Arm Mbed libraries or AT commands for radio control
Interfaces	Up to 19 Digital I/O, 10 Analog Inputs, 2 DAC Outputs, I2C, SPI, Wake Pin, Reset Pin, Full UART, MBED / simple UART (RX & TX only), MBED Programming Interface
Physical Dimensions	23.6 mm X 23.6 mm x 3.51 (.93″ x .93″ x 0.14″)

CPU	ST Micro ST32L151CCU6 (ARM® Cortex®-M3) 32 MHz
Max Clock	32 MHz
Flash Memory	256 KB, with xDot library 136 KB available; with AT firmware, 56 KB available
EEPROM	8 KB, available 6 KB
SRAM	32 KB
Backup Register	128 bytes, available 88 bytes

Max Transmitter Power Output (TPO)	19 dBm	19 dBm	14 dBm
Max Receive Sensitivity	-130 dBm	-130 dBm	-137 dBm
Link Budget (*)	145 dB Point-to-Multipoint 147 dB Point-to-Point	145 dB Point-to-Multipoint 147 dB Point-to-Point	151 dB Point-to-Multipoint 147 dB Point-to-Point
Deep Sleep Current	< 2uA		

Max Effective Isotropic Radiated Power (EiRP)	36 dBm	36 dBm	16 dBm

- (*) The calculation assumes two 0 dBi antennas.
- North America: A Greater link budget is possible with higher-gain antennas. Europe: This is the maximum link budget.

Note: Point-to-Multipoint utilizing MultiTech Conduit Gateway with MTAC-LORA accessory card.

-A00 Models	U.FL and Trace (ULF/TRC)
-A01 Models	Trace only (TRC)

Operating Temperature	-40° C to +85° C (-40° F to +185° F)
Storage Temperature	-40° C to +85° C (-40° F to +185° F)
Relative Humidity	20% to 90% RH noncondensing

EMC Compliance	Contact MultiTech	AS/NZS CISPR 22	EN 55022 Class B, EN 55024 CISPR 22:2008
Radio Compliance	Contact MultiTech	AS/NZS 4268:2012 + a1:2013 MPE Standard 2014	EN 300 220-2 V 2.4.1:2012 EN 301 489-03 V1.6.1:2013
Safety	Contact MultiTech	AS/NZS 60950.1:2015	IEC 60950-1 2nd ED AM1 + AM2

Quality	MIL-STD-810G: High Temp, Low Temp, Random Vibration. SAE J1455: Transit Drop & Handling Drop, Random Vibration, Swept-Sine Vibration. IEC68-2-1: Cold Temp. IEC68-2-2: Dry Heat

(**) Actual performance speeds may be affected by a variety of attributes such as distance from the gateway, data loads, packet sizes, etc.

Note: AS923 models are for use in many Asia Pacific countries. Contact your MultiTech sales representative for more information.

Models	**MTXDOT-EU1-IN1**	**MTXDOT-JP1**	**MTXDOT-KR1**	**MTXDOT-NA1**
Region/Country	India	Japan	Korea	North America
LoRa Radio Frequency Plan	IN865-867	AS920-923 (“AS1”)	KR920-923	US902-928
Listen-Before-Talk (LBT) Enabled	No	Yes		No
Channel Capacity	8-channels			
Range	Up to 10 miles (15 km) line of sight, 1 – 3 miles (2km) into buildings			
Communication	LoRaWAN 1.0.4 compliant, Class A and Class C Arm Mbed libraries or AT commands for radio control			
Interfaces	Up to 19 Digital I/O, 10 Analog Inputs, 2 DAC Outputs, I2C, SPI, Wake Pin, Reset Pin, Full UART, MBED / simple UART (RX & TX only), MBED Programming Interface			
Physical Dimensions	23.6 mm X 23.6 mm x 3.51 (.93″ x .93″ x 0.14″)			

CPU	ST Micro ST32L151CCU6 (ARM® Cortex®-M3) 32 MHz
Max Clock	32 MHz
Flash Memory	256 KB, with xDot library 136 KB available; with AT firm ware, 56 KB available
EEPROM	8 KB, available 6 KB
SRAM	32 KB
Backup Register	128 bytes, available 88 bytes

Max Transmitter Power Ou tput (TPO)	14 dBm	19 dBm	19 dBm	19 dBm
Max Receive Sensitivity	-137 dBm	-130 dBm	-130 dBm	-130 dBm
Link Budget (*)	151 dB Poin t-to-Multipoi nt 147 dB Poin t-to-Point	145 dB Poin t-to-Multipoi nt 147 dB Poin t-to-Point	145 dB Poin t-to-Multipoi nt 147 dB Poin t-to-Point	145 dB Poin t-to-Multipoi nt 147 dB Poin t-to-Point
Deep Sleep Current	< 2uA			
Max Effective Isotropic Ra diated Power (EiRP)	16 dBm	36 dBm	36 dBm	36 dBm

- (*) The calculation assumes two 0 dBi antennas.
- North America: A Greater link budget is possible with higher-gain antennas. Europe: This is the maximum link budget.

Note: Point-to-Multipoint utilizing MultiTech Conduit Gateway with MTAC-LORA accessory card.

-A00 Models	U.FL and Trace (ULF/TRC)
-A01 Models	Trace only (TRC)

Operating Temperature	-40° C to +85° C (-40° F to +185° F)
Storage Temperature	-40° C to +85° C (-40° F to +185° F)
Relative Humidity	20% to 90% RH noncondensing

EMC Compliance	EN 55022 Class B, EN 55024 CISPR 22:2008	TELEC, Radio/ Telecom Biz Act, GITEKI	National Radio Research Agency Notice 2018-29	US: FCC Part 15 Class B Canada: ICES-003 Mexico: TBD
Radio Compliance	EN 300 200	Japan Gitek i, Radio/ Telecom Biz Act	Ministry of Science and ICT Notice 2018-90	FCC 15.247 :2015 FCC 15.109 :2015 FCC 15.107 :2015

Safety	IEC 60950-1 2nd Ed A M1 & AM2	IEC 60950-1 2nd Ed A M1 & AM2	2368-1	US: UL 60950-1 2nd ED Canada: cUL 60950-1 2nd ED Mexico: TBD
Quality	MIL-STD-810G: High Temp, Low Temp, Random Vibration. SAE J1455: Transit Drop & Handling Drop, Random Vibration, Swept-Sine Vibration. IEC68-2-1: Cold Temp. IEC68-2-2: Dry Heat			

(**) Actual performance speeds may be affected by a variety of attributes such as distance from the gateway, data loads, packet sizes, etc.
Note: AS923 models are for use in many Asia Pacific countries. Contact your MultiTech sales representative for more information.

EDGE INTELLIGENCE

The MultiTech xDot® is Arm® Mbed™ compatible, meaning applications can be written and compiled quickly online using developer-friendly libraries, downloaded and hosted within the xDot. Decision making and control is distributed to the edge, enabling data to be more actionable without the heavy lift required to optimize RF performance, implement complex IoT middleware and security protocols needed to deploy a low-touch install. In addition, xDots come from the factory with AT command firmware preloaded. This means you can use the xDot as an AT command-driven LoRa modem. No custom software development for the xDot is needed when operating in this mode.

HIGHLIGHTS

Applications

- Securely manage and harvest sensor data
- Control and monitor remote assets and devices
- Low power for 10+ year battery performance

xDot LGA
Family Footprint

Operating Modes

- Developer-friendly Arm Mbed libraries provide customization capability for specific applications
- Comprehensive AT command instruction set

DEVELOPER KIT

- The MultiTech xDot (MTMDK-XDOT) Micro Developer Kit is a USB dongle that allows a developer to plug in a MultiTech xDot (MTXDOT-XXX) and start developing their application.
- Its portable design makes it ideal for connecting to a laptop and doing range testing of the LoRa network.
- This kit includes a development board, xDot, an integrated LoRa antenna, and a Quick Start Guide.

YOU MAY ALSO BE INTERESTED IN: MULTITECH CONDUIT® FAMILY

- MultiTech Conduit® family of products is the industry's most configurable, manageable, and scalable cellular communications gateways for industrial IoT applications.
- Network engineers can remotely configure and optimize their Conduit performance through DeviceHQ®, the world's first IoT Application Store and Device Management platform.
- The award-winning Conduit series comes in three variants designed to address specific IoT gateway use cases:

- **MultiTech Conduit:** Indoor industrial gateway, ideal for environments that require metal casing for protection against particles and debris and require an industrial temperature range.
- **MultiTech Conduit IP67 Base Station:** Outdoor IP67-rated gateway ideal suited for performing in harsh environments such as rain, snow, extreme heat, and high winds.
- **MultiTech Conduit AP:** Indoor access point ideal for commercial environments (e.g., hotels, offices, retail facilities) to deepen LoRa coverage in difficult-to-reach places where cell tower or rooftop deployments may not perform as well.

ORDERING INFORMATION

MultiTech xDot® Asia Pacific Models

Model Description Region

- MTXDOT-AS1-A00 AS923 MHz SMT LoRa UFL/TRC APAC
- MTXDOT-AS1-A01 AS923 MHz SMT LoRa TRC APAC

MultiTech xDot® Australia Models

Model Description Region

- MTXDOT-AU1-A00 AU915 MHz SMT LoRa UFL/TRC AU
- MTXDOT-AU1-A01 AU915 MHz SMT LoRa TRC AU

MultiTech xDot® European Models

Model Description Region

- MTXDOT-EU1-A00 868 MHz SMT LoRa UFL/TRC Euro
- MTXDOT-EU1-A01 868 MHz SMT LoRa TRC Euro

MultiTech xDot® India Models

Model Description Region

- MTXDOT-EU1-IN1-A00 IN865 MHz SMT LoRa UFL/TRC India

MultiTech xDot® Japan Models

Model Description Region

- MTXDOT-JP1-A00 AS923 MHz SMT LoRa UFL/TRC w/LBT Japan

MultiTech xDot® Korea Models

Model Description Region

- MTXDOT-KR1-A00 KR920 MHz SMT LoRa UFL/TRC w/LBT Korea

MultiTech xDot® North American Models

Model Description Region

- MTXDOT-NA1-A00 915 MHz SMT LoRa UFL/TRC NAM
- MTXDOT-NA1-A01 915 MHz SMT LoRa TRC NAM

Note: All models are available as 1 1-Pack or a 100-Pack

MultiTech xDot® Developer Kits
Model Description Region

- MTMDK-XDOT-AS1-A00 AS923 MHz Developer Kit, includes an AS923 MHz xDot APAC
- MTMDK-XDOT-AU1-A00 AU915 MHz Developer Kit, includes a AU915 MHz xDot AU
- MTMDK-XDOT-EU1-A00 868 MHz Developer Kit, includes a 868 MHz xDot Euro
- MTMDK-XDOT-EU1-IN1-A00 IN865 MHz Developer Kit, includes an IN865 MHz xDot India
- MTMDK-XDOT-KR1-A00 KR920 MHz Developer Kit,
- includes a KR920 MHz xDot w/LBT India
- MTMDK-XDOT-JP1-A00 AS923 MHz Developer Kit, Japan includes an AS923 MHz xDot w/LBT
- MTMDK-XDOT-NA1-A00 915 MHz Developer Kit, includes a 915 MHz xDot NAM

Developer kits include:
Developer board (with xDot and integrated antenna) and Quick Start Guide.

MultiTech xDot® Accessories
Model Description Region

- AN868-915A-1HRA 868-915 MHz RP-SMA Antenna, 8″ (3.0dBi) Global
- CARSMA-UFL Reverse SMA-to-UFL Coax RF Cable, 6″ Global

Go to www.multitech.com for detailed product model numbers.

Services & Warranty

- MultiTech’s comprehensive Support Services programs offer a full array of options to

suit your specific needs.
- These services are aimed at protecting your investment, extending the life of your solution or product, and reducing the total cost of ownership.
- Our seasoned technical experts, with an average tenure of more than 10 years, can walk you through smooth installations, troubleshoot issues, and help you with configurations.

Technical Support Services

- At MultiTech, we're committed to providing you personalized attention and quality service while providing you with a quick response to your product support needs.
- We have several options of support for you to choose from.
- For additional information on Support Services as well as other service offerings, please contact your MultiTech representative or visit www.multitech.com/support.go

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FAQ

- **Q: What is the range of the xDot device?**
  - **A:** The xDot device has a range of up to 10 miles line of sight and 1 – 3 miles into buildings.

- **Q: How can I optimize power usage for my xDot device?**
  - **A:** You can optimize power usage by managing the power settings and ensuring efficient power management.
- **Q: What certifications does the xDot device have?**
  - **A:** The xDot device is EMC compliant and meets various safety and quality standards such as AS/NZS CISPR 22 and IEC 60950-1.

Documents / Resources

	MULTITECH xDot Long Range LoRa Module [pdf] User Guide MTXDOT-AS1, MTXDOT-AU1, MTXDOT-EU1, xDot Long Range LoRa Module, xDot, Long Range LoRa Module, Range LoRa Module, LoRa Module

References

- User Manual

MULTITECH

Long Range LoRa Module, LoRa Module, MTXDOT-AS1, MTXDOT-AU1, MTXDOT-EU1, MULTITECH, Range LoRa Module, xDot, xDot Long Range LoRa Module

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